

INSTRUCTIONS

1. This paper consists of 14 questions from sections A and B
2. Attempt all questions in both sections
3. All necessary working and answers for each question done must be shown clearly
4. Mathematical tables published by NECTA may be used

SECTION A (60 Marks)

1. (a) A room with length 270cm and width 150cm is to be covered with square tiles. What is the largest size of the tiles to be used if no space of the room is to be uncovered?

(b) The area of a country is 2.3×10^{11} square metres of which 9.2×10^{10} square metres consists of water bodies. What is the area of the dry land?
2. (a) Solve the equation $\left(\frac{1}{2}\right)^{-x} \left(\frac{1}{2}\right)^{18} - \left(\frac{1}{32}\right)^x = 0$
(b) Find the value of x in the equation $12 \log_x \sqrt{2} + 8 \log_3 27 = 25$
3. (a) Jamungo secondary school has a total of 500 students of which 350 can speak English and 300 can speak French. By using a Venn diagram, find how many students can speak only one language.
(b) Two coins are tossed simultaneously. Find the probability that the first shows the head and the second shows the tail
4. (a) The lines $2x + 3y = 4$ and $3x - 2y = 5$ meet at point P and the lines $3x - 4y = 7$ and $2x + 5y = 2$ meet at point Q . Find the equation of the line joining the points P and Q .
(b) Given the position vectors $\vec{OA} = -2\vec{i} + 4\vec{j}$, $\vec{OB} = 2\vec{i} + \vec{j}$ and $\vec{OC} = 3\vec{i} - \vec{j}$. Draw on the same pair of axes these vectors and the vector \vec{CB} . What is the relationship between the vectors \vec{OA} and \vec{CB} ?
5. (a) Find the perimeter of a regular six sided polygon inscribed in a circle of radius 10cm
(b) Draw two parallel lines PQ and RS and a transversal AB. On the same diagram, assign
 (i) Vertically opposite angles m and n
 (ii) Corresponding angles a and b
 (iii) Alternate interior angles e and f
6. (a) A typist types 100 words per minute. At this rate, find the maximum number of words that can be typed within 9 hours.
(b) Four people can eat 2 bags of rice each weighing 10 kg in 12 days. How many people can eat 6 bags of rice of the same weight in 18 days?
7. (a) A car was bought for 12 million and then sold in the following year for 10.5 million. Find the percentage loss.
(b) Given:

Opening stock 01-01-2012 34,430/=

Closing stock 31-12-2012 26,720/=

Net purchases during 2012 212,290/=

Expenses for the year 45,880/=

Gross Profit is 50% of cost of goods sold

Find: (i) Cost of goods sold (ii) The gross profit

8. (a) Find the sum of the series $1+2+4+\dots+512$.
 (b) The arithmetic mean and geometric mean of two numbers are both equal to six. Find the numbers.
9. (a) Without using tables, express the values of $\cos 75^\circ$, $\tan 15^\circ$ and $\sin 15^\circ$ in surd form.
 (b) In a triangle LMN, $\overline{LM} = 5\text{cm}$, $\overline{LN} = 6\text{m}$, and $\angle N = 66^\circ$. Find \overline{MN}
10. (a) Solve the simultaneous equations: $\frac{3}{x} + \frac{2}{y} = 5$ and $\frac{1}{x} + \frac{1}{y} = 2$
 (b) Factorize the expression $x^2 - x - 12$ by inspection method.

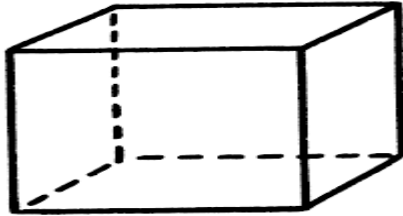
SECTION B (40 Marks)

11. (a) The scores of 45 pupils in a Civics test were recorded as follows:

30	65	50	62	40	35	64	32	28	59	60	82
	24										
35	63	68	46	48	73	92	54	46	63	75	58
	43										
71	72	27	28	61	71	36	64	80	61	64	76
	64										
35	76	73	70	64	46						

Group these data in the class intervals 21-40, 41-60, etc. and use it to find the mean, mode and median

- (b) A tangent is drawn from the external point $P(5, -1)$ to the circle whose centre is at $C(\frac{1}{2}, 0)$. If the radius of the circle is $\frac{5}{2}$ units, find the length of the tangent.
12. (a) A ship starts at $(40^\circ\text{S}, 140^\circ\text{W})$. It sails north for 12 hours, then east for 20 hours. If its speed was a constant 20 knots, find the latitude and longitude of its final position.
 (b) Find the surface area and volume of a prism below:



13. (a) Find the point $P(x, y)$ if $\begin{pmatrix} 2 & 3 \\ 4 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -23 \\ -11 \end{pmatrix}$.
 (b) A translation T maps the point $P(x, y)$ in part (a) above into $(3, 2)$. Find where it takes the point $(7, 4)$.
 (c) Find the image of the point obtained in part (b) above under a rotation of 90° followed by another rotation of 180° anticlockwise, about the origin
14. (a) A company produces two types of ornaments A and B that requires gold and silver. Each unit of type A requires 4 grams of silver and 8 grams of gold. Type B requires 8 grams of silver and 4 grams of gold. The company has only 400grams of silver and 640 grams of gold. Each unit of type A brings a profit 1000 Tsh and each type B brings a profit of 1600 Tsh . In which way should a company produce so as to obtain the maximum profit?
 (b) Given that $f(x) = \frac{5-6x}{3-18x^2}$
 (i) State the domain of the function
 (ii) Find the value of x at which $f(x)$ is undefined
 (iii) Find the value of x at which $f(x) = 3$